

Topics connected to **energy** and **environment** research are the aim of most projects developed in the last 10 years. Different materials and components for **fuel cells** (PEMFC and SOFC), solid electrolytes and electrodes for **Li-batteries**, come together with protective and **environmentally friendly anticorrosive coatings**.

New direct alcohol and hydrogen fuel cells for naval and aeronautical applications “PILCONAER”

R & D Program ‘Tecnologías 2013 Comunidad de Madrid’

INTRODUCTION

In the current context of high demand for reliable, low cost and low environmental impact energy sources, many countries and companies are mostly focused on the use of fuel cells in diverse fields such as transportation, stationary power generation and portable devices. Lately, fuel cells have also begun to be applied in **naval and aeronautical systems** due to their high efficiency, low noise and environmental advantages. These applications could range from propulsion systems to **auxiliary power units (APU)**. The major problems associated with the use of fuel cells in these areas are the current high cost of the materials used and the lack of durability testing under these particular conditions. Other very specific parameters to consider are the weight of the fuel cell in the case of aircraft applications and its final volume in marine systems. Security issues related to the fuels also represent enormous importance: flammability, high pressure and low availability in the case of **hydrogen** and toxicity when **methanol** is used as fuel. At this point, the use of **ethanol** is considered crucial. It has the advantage of ease of transportation, easy storage and refuelling and, unlike methanol, is non-toxic. On the other hand, **bioethanol** is an energy source with a promising future, as it can be produced from almost any raw materials containing sugar or starch which involves the use of local energy sources, contributing to the diversification of energy supply, reducing imports dependence, increasing security and generating new opportunities for agriculture.



OBJECTIVES

The **main objective** of this four year project **PILCONAER** starting on **October 2014** is the development of low power stacks fed with **methanol (DMFC)** and **ethanol (DEFC)** based on the development of new electrocatalysts and membranes. The materials are considered first from the point of view of application in fuel cells fed with **hydrogen (PEMFC)** and, subsequently, optimized and used on fuel cells fed directly with **alcohols**. A particular objective of major importance is the development of cells fed with ethanol in **alkaline medium** in order to eliminate the use of platinum as the catalyst and increase the efficiency of the electrochemical fuel cell while cost is decreased.

PARTICIPANTS

- The consortium combines six research groups with high **complementarity** and wide **expertise** in different areas: - Synthesis and characterization of new MEA component materials

Instituto de Cerámica y Vidrio (CSIC)

Instituto de Ciencia y Tecnología de Polímeros (CSIC)



- Development and evaluation of fuel cell stacks

Escuela Técnica Superior de Ingenieros Navales (UPM)

Instituto Nacional de Técnica Aeroespacial (INTA)



- Development of physical and mathematical models to predict the behavior of the fuel cell

Facultad de Ciencias Químicas (UCM)



Additionally, four companies have shown interest in the proposal: Asociación de Investigación para la Industria del Juguete, Conexas y Afines, ARIEMA Energía y Medioambiente S. L., Compañía Española de Sistemas Aeronáuticos S. A., Siemens S. A.



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